

What is claim is

1. A white light-emitting device, comprising

a light-emitting diode for emitting a first light with predetermined wavelength; and

5 a phosphor receiving the light of the light-emitting diode and emitting a second light of different wavelength for mixing with the first light and forming a white light;

wherein the phosphor material has a general formula  $(Y_xM_yCe_z)Al_5O_{12}$ , where  $x + y = 3$ ,  $x, y \neq 0$ ,  $0.5 > z > 0$ , and M is selected from the group  
10 consisting of Tb, Lu, and Yb, with  $(Y_xM_y)Al_5O_{12}$  serving as a host and Ce as an activator, the ratio of M is adjusted to change a crystal field in the host matrix, thus changing the wavelength of the second light.

2. The white light-emitting device as in claim 1, wherein the light-emitting diode has a domination wavelength between 430 nm and 500  
15 nm.

3. The white light-emitting device as in claim 1, wherein the phosphor has a domination wavelength between 560 nm and 590 nm.

4. The white light-emitting device as in claim 1, wherein the phosphor is made from a group consisting of metal oxide, nitrate, metal organic  
20 compound and metal salt.

5. The white light-emitting device as in claim 1, wherein the phosphor is made by a solid-state reaction process.

6. The white light-emitting device as in claim 1, wherein the phosphor is

made by a chemical process.

7. The white light-emitting device as in claim 6, wherein the chemical process is a citrate sol-gel process.

8. The white light-emitting device as in claim 6, wherein the chemical process is a co-precipitation process.

9. A phosphor used for a white light-emitting device and receiving a light with a first wavelength of the light-emitting diode and emitting light with a second wavelength different to the first wavelength and mixed with the light of the light-emitting diode to form a white light, the phosphor having a host matrix of  $(\text{Tb}_x\text{M}_y)\text{Al}_5\text{O}_{12}$  and using Ce as activator,

wherein the phosphor material has a general formula  $(\text{Y}_x\text{M}_y\text{Ce}_z)\text{Al}_5\text{O}_{12}$ , where  $x + y = 3$ ,  $x, y \neq 0$ ,  $0.5 > z > 0$ , and M is selected from the group consisting of Tb, Lu, and Yb, with  $(\text{Y}_x\text{M}_y)\text{Al}_5\text{O}_{12}$  serving as a host and Ce as an activator, the ratio of M is adjusted to change a crystal field in the host matrix, thus changing the wavelength of the second light.

10. The phosphor as in claim 9, wherein the light-emitting diode has a domination wavelength between 430 nm and 500 nm.

11. The phosphor as in claim 9, wherein the phosphor has a domination wavelength between 560 nm and 590 nm.

12. The phosphor as in claim 9, wherein the phosphor is made from a group consisting of metal oxide, nitrate, metal organic compound and metal salt.

13. The phosphor as in claim 9, wherein the phosphor is made by a

solid-state reaction process.

14. The phosphor as in claim 9, wherein the phosphor is made by a chemical process.

5 15. The phosphor as in claim 14, wherein the chemical process is a citrate sol-gel process.

16. The phosphor as in claim 14, wherein the chemical process is a co-precipitation process.